REMARKS

The Examiner is thanked for the detailed comments. While the Applicants have reviewed carefully the Examiner's rejections, they respectfully request the Examiner's further consideration of the reasons set out below:

Claim 1 has been amended to more clearly formulate the invention.

The current invention is concerned with the **robust** detection of dither (pilot) tones, which are modulated onto optical channels and used for identification of the optical channels in optical networks.

Though the use of pilot tones for the purpose of channel identification has been known in the prior art (please see the two IDSs submitted by the Applicant, including the Pedersen reference cited by the Examiner), the problem still exits how to **reliably** detect these dither tones, especially for optical channels having a relatively low power, thus avoiding confusion with noise.

To achieve this goal, claim 1 of the current invention proposes modulating of each optical channel with at least two continuous dither tones, **each dither tone having a precisely determinable phase relationship sufficient for coherent processing of said each dither tone,** followed by processing of these dither tones in a particular way, in which said precisely determinable phase relationship is important, namely to perform coherent averaging of fast Fourier Transforms (FFTs) over a plurality of FFT operations, **comprising an accumulation of the FFT amplitudes in accordance with said respective determinable phase**

relationships for successive FFT periods, to detect dither tones of a channel having a relatively low power.

Although Pedersen introduces two dither tones modulated onto an optical channel, this reference is mainly concerned with the intensity and the frequency range of these dither tones. Pedersen doesn't mention or suggest the importance of preserving the phase relationship for each dither tone in such a manner so as to make the phase relationship precisely determinable for the purpose of further coherent processing. Pederson is not concerned with the reliability of dither tone detection and the improvements to the ways how this detection can be performed.

Lyons is a general text book which describes various FFTs, including incoherent and coherent processing, which may have numerous applications.

A direct combination of Pedersen and Lyon will not lead to the current invention for the following reasons:

1) because Pedersen **does not** teach preserving and precisely measuring phase relationships of dither tones, and therefore 2) the coherent FFT processing of Lyons **cannot be applied** to the Pedersen measurements.

Additionally, in order to properly combine the Pedersen and Lyon references to lead to the current invention, someone skilled in the art would need to perform the following additional steps, namely:

a) to identify **the problem of the lack of robust detection** of dither tones modulated onto optical channels of low power, which was **not known** and **was not of concern** to Pedersen at the time of his invention; and

b) **to ensure precisely determinable measurements of phase relationships** for each dither tone modulated onto each optical channel, and

c) **to apply** a procedure of **coherent averaging** of FFT results to **dither tones processing**, the area in optical networks where coherent averaging has not been applied before (though coherent averaging *per se* has been known with regard to other applications).

The Examiner's attention is also drawn to claim 4 introducing another limiting feature which further increases reliability of dither tone detection, namely, detecting the number of dither tones, which is lower than the number of dither tones modulated onto an optical channel. For example, the optical channel may be modulated with three dither tones, of which only detection of two may be required for robust identification of the optical channel.

Claim 6 solves a problem of robust identification of dither tones in an optical network in a slightly different way, namely, by solving the problem of limiting or decreasing the undesirable eye closure - due to the simultaneous modulation of a plurality of dither tones onto an optical channel - for detection of the high speed data signal carried by the optical channel.

Again this problem was not taught or identified by Pedersen at the time of his invention, and there were no solutions offered or hinted at in Pedersen how to solve this problem. Moreover, **this problem** of undesirable eye closure **is a direct consequence** of the way how dither tones are applied onto an optical channel in Pedersen, i.e., modulated simultaneously, thus increasing the depth of modulation and therefore decreasing the quality of detection.

Claim 6 of the current invention solves the above problem by intensity modulating each of a plurality of optical channels to be identified with a respective selection of at least two of said dither tones **in a cyclically repeated sequence and with a predetermined periodicity.**

Claim 10 describes the respective modulation arrangement.

The Applicants are certain that it would not be obvious to find a solution to the problem of decreasing quality of optical channels detection because of the deteriorating eye closure in view of Pedersen.

First of all, Pedersen did not even identify the problem of decreasing quality of channels detection caused by applying multiple dither tones **simultaneously**, which is Pedersen's preferred embodiment.

Secondly, Pederson **did not understand the reason** of the decreasing quality of detection, i.e. that it is associated with the deteriorating eye closure, and accordingly **could not possibly teach** the solution to this problem.

It definitely required time and substantial engineering experimentation to identify this problem and to find its remedy.

Please note that the current invention as described in claim 6 teaches **the opposite** of what is taught in Pedersen, i.e. not to apply dither tones onto optical channels simultaneously, instead to apply them in a cyclically repeated sequence and with a predetermined periodicity as cited in claim 6.

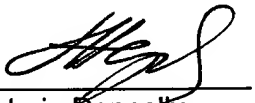
Additionally, the published patent application to Pedersen has been in the public domain for over two years before the current invention, which is a considerable time for such a fast paced industry as optical networks, and the Lyon reference has been in the public domain for decades.

This makes another argument that to find solutions **to more robust detection of optical channels in optical networks**, either in view of Pedersen alone, or in view of the combination of Pedersen and Lyon, is not a trivial task.

In view of the above amendments and arguments, the Applicants request the Examiner to favorably reconsider the amended claims with a view to an early allowance.

The Commissioner is hereby authorized to deduct any prescribed fees for these amendments from our Company's **Deposit Account No. 501832.**

Yours truly,
WAN, P.W., et al

By: 
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